Shree H. V. P. Mandal's

Degree College of Physical Education

(A Multi-faculty Autonomous College)

Bachelor of Vocation (Software Development)

(B. Voc. Software Development)

(3 Years Bi-Annual, semester pattern)

Syllabus (Credit Based)

Year 2020-21

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Semester-I

Syllabus (Credit Based)

Year 2020-21

Bachelor of Vocation (Software Development)

Semester-I

Subject Code	20BVSD101	
Subject Name	Communication Skill	
Total Lectures	60	
Total Credits	4	
Units	**Contents**	**Total Hours**
I	Meaning, significance of good communication. Means of communication- oral & written. Language Proficiency , Types of Sentences, Clauses.	12
II	Forms of Written Communication ,Application letters, curriculum vitae/Resume, Creative Writing ,Drafting Memorandum, E-mail , Composing Notices, Invitations.	12
II	Business Communication : Introduction to Business Communication , Communication in Organizations ,Email Communication, Non-verbal Communication,	12
IV	Inter Departmental communication – Internal Memo, office circulars, office order, office notes. Written Communication Skills- Notices, Agendas, Minutes, Fax messages.	12
Text Books	1. Mac Millans, English Grammar 2. M. Raman, S. Sharma, Technical communication: Principles and practice, first edition, Oxford University Press(2004).	

Subject Code	20BVSD102	
Subject Name	Computer Proficiency-I	
Total Lectures	60	
Total Credits	4	
Units	**Contents**	**Total Lectures**
1	Introduction to Fundamentals of Computer Brief history of Development of Computer, Generation of Computer, Basic Block Diagram of Computer, Basic Component of computer system, Types of computer System, Characteristic of computer s system, Application of computer System	12
2	Introduction to basic component of the computer System Input and Output Device , Memory RAM ROM and other types of memory, Secondary storage device ,Concept of Hardware, Software and Types of Software.	12

3	Introduction to Windows Basic concept of Operating System, Types of Operating system, My Computer, Recycle-Bin, Status Bar, Start Menu selection, Running an application, Windows explorer to view file, folder and Directories, Creating and renaming file and Folder, Minimize, Restore and Maximize forms of windows. Basic Component of Windows : Desktop, Frame, Title Bar, Menu Bar, Status Bar, Scroll Bar, Using Right Button of the mouse Creating Shortcut, Basic Windows Accessories : Notepad, Paint, Calculator, WordPad, using Clipboard	12
4	Introduction to Internet, Internet Evolution, Internet Vs Intranet , ISP, Domains Name System, URL, Web Browsers, Search Engines, Internet Application Email concept, POP and WEB Based Email, Protocol	12
Text/ Ref Books	1. Foundations Computing BFB publications-2006, Pradeep K. Sinha and Prit Sinha 2. The internet Book, Douglas E. Comer , Purdue University, West Lafayette in 2005 3. Fundamentals of computers, V.Rajarman, prentice hall of India, New Delhi 2000 Computer Fundamentals, B.Ram, New age international publishers 2006	

Practical

Subject Code	20BVSD103
Subject Name	Lab Based on Computer Proficiency and Communication Skill
Total Lectures	60 Hours
Total Credits	4

Subject Code	20BVSD104
Subject Name	Program Design and Testing
Total 60 Lectures	
Total Credits	**4**

Units	Contents	Total Lectures
I	**Introduction to Programming:** How to develop a program, 15 Algorithms, Flow-charts, Testing and Debugging a program, Documentation. **Basics of Programming** : Data types, constants, variables, macros, overflow and underflow of data, Operators, Expressions, precedence and associativity of operators, type conversion. Input and Output: Character I/O, formatted I/O, **Decision Making, Branching and Algorithm**: if, if..else, goto, conditional operator, switch statement.	
II	**S**olving problems with iteration, divide and conquer methods, while, do 15 while and for loops, Jumps in loops, break and continue statements. **Commonly used data Structures :** Array, Queue and Stack. Operations on Data Structures.	
III	**Functions:** Top down approach of problem solving, call by value and 15 call by reference, recursion, calling conventions. **Structures:** Defining & initializing structure, structure to represent entities and use in problem solving, structure and array. **Strings:** defining strings, searching different types of characters in strings, searching for patterns, splitting strings into tokens separated by delimiters.	
IV	Brief introduction to software systems and SDLC, Process Of Testing, 15 Writing and applying test cases, Different types of testing, Designing a program, produce professional quality code, Software development life cycle, User requirement analysis and design, design and execute teste to identify software bugs, Repair software bugs, redesigning and refactoring code when necessary.	
Text Books	1. R.G. Dromey, "How to solve it by Computer", Pearson Education. 2. Byron S Gottfried "Programming with C", Tata McGrawhill. 3. The Art of Software Testing, 3rd Edition, Glenford J. Myers, Corey Sandler, Tom Badgett. 4. Practical approach to Data structure and algorithm by Sanjay Pahuja.	
Refere nces	1. Kanetkar Y, "Let us C", BPB Publications. 2. Software Testing: A Craftsman's Approach, Fourth Edition, Paul C. Jorgensen 3. Introduction to data structure by T.L Naps & Bhagatsing.	

Subject Code	20BVSD105
Subject Name	Mathematical Foundation
Short Name	MF
Total Lectures	55

Total Credits	4	
Units	**Contents**	**Hours**
1	Introduction to Discrete mathematics, Normal Forms: Disjunctive and Conjunctive Normal forms, Relation : Types of relation, operations on relation, Permutations and combinations, Function : Representation of function, types of function, classification of function, Lattice, Boolean Algebra	14
2	Graph Theory: Introduction to Graph, Matrix representation of a graph, Transport network, Minimal cost flow, Errors Analysis, Floating-point representation of numbers, Iterative Methods: Bisection, False position, Newton-Raphson methods, Secant method.	14
3	Metrices and linear system of equation: Matrix operations, transpose of matrix, inverse of matrix, rank of a matrix, consistency of a linear system of equation, Interpolation: Introduction, Lagrange Interpolation, Difference Tables, Truncation Error in Interpolation, Spline Interpolation	14
4	Least squares approximation of function: Linear Regression, Polynomial Regression, Numerical Integration: Trapezoidal rule, Simpson's 1/3 Rule, Simpson's 3/8 Rule, Euler's Method, Runge-Kutta method,	13
Text Books	1. T Veerarajan, "Discrete mathematics with graph theory and combinatorics." 2. NarsinghDeo ,"Graph theory with applications to engineering and computer science" 3. V. Rajaraman, "Computer Oriented Numerical Methods", PHI 4. S. S. Sastry, "Introductory Methods of Numerical Analysis", PHI	
Ref Books	1. C. L. Liu, "Elements of Discrete mathematics" 2. Bernard Kolman, Robert C. Busby, sharan cutler Ross,Nadeem-UrRaheman, "Discrete mathematical structures". 3. Steven C. Chapra, Raymond P. Canale, "Numerical Methods for Engineers", Tata McGraw Hill. 4. M. Goyal, "Computer Based Numerical & Statistical Techniques"	

Practical

Subject Code	20BVSD106
Subject Name	Lab Based on Programing Techniques
Total Lectures	45 Hours
Total Credits	3

Subject Code	20BVSD107
Subject Name	Lab Based on Software Design and Testing
Total Lectures	45 Hours
Total Credits	3

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Semester-II

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Year 2020-21

(B. Voc. Software Development)

Semester-II

Subject Code	20BVSD201
Subject Name	Employability Skills and Work Practices
Total Lectures	**60**

Total Credits		
Units	**Contents**	**Total Lectures**
1	Technical Skills: Basic literacy (Reading, Writing, Speaking), Learnability, Technological skills, Numeracy skills, Adaptability.	15
2	Higher order thinking skills: Occupational Knowledge, Learning, Reasoning, Creative thinking, Decision making, Problem-solving. Personal Skills: Knowledge, Integrity, Self- control, Self-confidence, Emotional literacy, Initiative, handling rejection and failure, stress and time management.	15
3	People / social skills: Teamwork, Respect, Ethics and Values, Networking, Interpersonal skills, Globally Aware, Generic Skills : Leadership, Team working, Project management, Oral communication skills , Self-perceived employability skills :Resilience, Behavioural Skills, Social Networking, Job- Seeking Skills, Labour Market Knowledge .	15
4	Best Work Practices: Code Reading & Reading, documentation, follow standards, write code for review, testing, keep asset safely, handy tools and techniques, eager to learn, stress management , managing managers, career planning.	15
Text Books	1. https://www.amazon.com/What-Employers-Want-EmployabilityHandbook by karen Holmes . 2. http://www.amazon.com/Better-Software-Faster-Practices-Prototyping-ebook/dp/B00L2GR7LQ//httpwwwtuto0a-20.by Tom De Schutter 3. http://www.amazon.com/Software-Architecture-Practice-3rdEngineering/dp/0321815734/httpwwwtuto0a-20. by Len Bass, Paul Clements, Rick Kazman. 4. http://www.amazon.com/Art-Lean-Software-Development/dp/0596517319/httpwwwtuto0a-20 by Curt Hibbs, Steave Jewett, Mike Sullivan.	
References	1. https://www.amazon.com/Essential-Skills- for the Agile-Developer- a guide to better Programming and Design by Alan Shalloway , Scott Bain, et al 2. https://www.amazon.com/Beyond-Skills-Gap-Preparing-Students for life and work by by Matthew T. Hora , Ross J. Benbow, et al	

Subject Code	**20BVSD202**
Subject Name	**Computer Proficiency-II**
Total Lectures	**60**
Total Credits	**4**

Units	Contents	Total Lectures
I	Word Processing Introducing Microsoft Word 2010, Features of MS word Application, Menu Bar, Tool Bar, Creating, Saving, and opening a word document. Text Formatting: setting Font, Font size, Color, Bullets and its styles, numbered lists, text styles.	12
II	Page Layout: Margin, size, Page orientation, Header and Footer. Inserting Pictures, clip-arts, shapes, symbols. Inserting and Formatting Table. Mail Merge.	12
III	Introducing Microsoft PowerPoint 2010:Title Bar Menu Bar with Its tabs, Tool Bar, Presentation, Slide, Creating Slide, selecting slide layout, , Inserting slide, duplicating slides, moving and deleting Slide in presentation.	12
IV	Effective presentation: Inserting and dealing in presentation for making it effective , Dealing with Objects like word Art, Clip Art, Image shapes, tables, sound, video. Enhancing the Presentation:What is Transition effect,different types of transition effects, What is Animation, implementing animation in presentation, Different types of animation.	12
	• Computer Course Kit-Windows-7 with Office2010(English)-by Vikas Gupta,Dreamtech Press. • Microsoft Office 2000 (in Hindi) by BPB Editorial Board, BPB Publication.	

Practical Subjects

Subject Code	**20BVSD203**
Subject Name	**Lab Based on Word and Powerpoint**
Total Lectures	**120 Hours**
Total Credits	**4**

Subject Code	**20BVSD204**
Subject Name	Analysis and design of web based applications
Course Objectives	1. Understand the principles of creating an effective web page 2. Develop skills in analyzing the usability of a web site. 3. Learn the language of the web: HTML and CSS.
Total Lectures	**60**
Total Credits	**4**

Units	Contents	Total Hours
I	Web Design Principles : Basic Principles involved in developing a web site, Planning process, Five Golden rules of Web Designing, World Wide Web, Why create a web site, Web Standards. Requirement Analysis, Importance / Advantages of requirement analysis	15
II	Introduction to HTML : What is HTML, HTML Documents, Basic structure of an HTML document, Creating an HTML document, Mark up Tags, Heading-Paragraphs, Line Breaks, HTML Tags.	15
III	Elements of HTML: Introduction to elements of HTML, Working with Text, Working with Lists, Tables and Frames; Working with Hyperlinks, Images and Multimedia; Working with Forms and controls.	15
IV	Introduction to Cascading Style Sheets: Concept of CSS, Creating Style Sheet, CSS Properties, CSS Styling(Background, Text Format, Controlling Fonts), Working with block elements and objects, Working with Lists and Tables, CSS Id and Class, Box Model(Introduction, Border properties, Padding Properties, Margin properties), CSS Color, Creating page Layout and Site Designs.	15
Text /Ref Books	1. Internet & World Wide Web, Deitel, Deitel & Nieto, Pearson Education 2. Satish Jain, Ambrish K. Rai and M. Geetha, Web Designing and Development, BPB Publications	

Subject Code	**20BVSD205**
Subject Name	**Media Content and Graphic Design**
Total Lectures	**60**
Total Credits	

Units	Contents	Total Lectures
I	Digital Content Creation: Determine the purpose, Create useful, quality content, Promote content on social media, Utilize photos and multimedia, Implement an SEO program, Track and analyze content	15
II	Graphics Principle and Method of Design Introduction to Multimedia, Sound Principles, Visual Communication, Digital Publishing, Design: Character, Background & Concept	15
III	Scope and applications of graphic design, Alignment, Balance, Consistency, Repetition, Contrast, Golden Rectangle, Proximity, Typographic Design, Generic Skills, Basics Graphic Design, Color theory for Computer Graphics, Web Design, Introduction to Computer Animation, Digital Portfolio Development & Presentation	15
IV	Multimedia Authoring, Animation the Production Process, Digital Portfolio Development & Presentation, Logo design issues, Book design issues, Web design issues, Graphic Design Tools, Web Campaign Implementation	15

Text/ Ref Books	Satish Jain, Ambrish K. Rai and M. Geetha, Web Designing and Development, BPB Publications	

Practical Subjects

Subject Code	**20BVSD206**
Subject Name	**Lab Based on Web Programing**
Total Lectures	**120 Hours**
Total Credits	**4**

Subject Code	**20BVSD207**
Subject Name	**Lab Based on Media Content and Graphic design**
Total Lectures	**120 Hours**
Total Credits	**4**

Subject Code	**20BVSD208**
Subject Name	**Mini Project**
Total Lectures	**60 Hours**
Total Credits	**2**

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Semester-III

Syllabus (Credit Based)

Year 2020-21

B. Voc. Software Development

Semester -III

Subject Code	20BVSD301
Subject Name	Interpersonal Skills
Total Lectures	**60**
Total Credits	**4**

Units	Contents	Total Lectures
1	Introduction: Interpersonal skills, Improvement of interpersonal skills, Verbal skills, Nonverbal skills, listening skills.	15
2	Decision Making, Negotiation skills, Assertion skills.	15
3	Cooperation and Collaboration skills.	15
4	Problem Solving skills and Self- Management skills.	15
Text Books	Interpersonal Skills: A Beginner Introvert's Guide on How to Develop Interpersonal Skills for Work and Home Kindle Edition by Henry Lee	
Ref Books	Interpersonal Skills In the Workplace: How to Work Well With Others Kindle Edition by Anthony Ekanem	

Subject Code	**20BVSD302**
Subject Name	**Data Management (Excel)**
Short Name	
Total Lectures	**55**
Total Credits	**4**

Units	Contents	Total Lectures
I	Introduction Excel, purpose and application of Excel, Excel Interface, Understanding and working with the Excel interface, Basic Navigation & Editing, Entering Information into cells, types of data (text, numbers, dates). Basic formatting. Working with multiple Worksheets	15
II	Orientation and efficiency: Editing, Viewing, Spreadsheet structure, Cell references, Named Ranges, Basic Macros Administration: Customising Excel, Connecting Workbooks, Protecting and Sharing, Googledocs, Excel troubleshooting	15
III	Data handling: Sorting & Filtering, Controlling user input, Working with Dates and Times, Working with Text, Lookup & Reference, Logical Functions	15
IV	Data analysis: Working with Numbers, Summarising data, PivotTables – Simple Summaries, PivotTables – Manipulating Data, PivotTables – Interpreting Data, Power Pivot – Handling Big Data, Formula Auditing, Modelling Presentation: Cell, Number and Conditional Formatting, Graphs and Charts, Page & Print Setup	15
Text Books	Computer Course Kit-Windows-7 with Office2010(English)-by Vikas Gupta,Dreamtech Press.	
Ref Book	Microsoft Office 2000 (in Hindi) by BPB Editorial Board, BPB Publication.	

Practical Subjects

Subject Code	**20BVSD303**
Subject Name	**Lab Based on Data Management with Excel**
Total Lectures	**120 Hours**
Total Credits	**4**

Subject Code	**20BVSD306**
Subject Name	**Lab Based on Data Structures and File Design**
Total Lectures	**120 Hours**
Total Credits	**4**

Subject Code	**20BVSD307**
Subject Name	**Lab Based on Statistical Analysis Tools**
Total Lectures	**120 Hours**
Total Credits	**4**

Subject Code	20BVSD304	
Subject Name	Data Structure and Algorithms	
Total Lectures	**40**	
Total Credits		
Units	**Contents**	**Total Lectures**
I	Introduction: Data Structure, Types, algorithms, complexity of algorithm, Big O notation, Best case, worst case, average case analysis of algorithms, file, file Vs database, data types, abstract data types, data structure operations, introduction to sorting, searching algorithms, Pattern searching, matching algorithms, learning algorithms, hash tables.	10
II	Arrays, Linked list , stack, Queues, operations on linear data structures, dynamic array, hash tables, sparse matrix, priority queue, dequeue, doubly linked list , circular linked list, two way linked list, double ended queue ,recursive operations using stack, priority queue application, skip list, unrolled linked list, XOR linked list, self organizing list.	10
III	Binary Tree, binary search tree, B-tree, AVL tree, self balancing tree, B+ tree, heap tree, Trie, Red-Black tree, representation and applications, Graph, directed, undirected, cyclic, acyclic, multi-graph, adjacency list, adjacency matrix, BFS, DFS, Shortest path algorithm, decision tree, pattern searching using Trie,	10
IV	Disjoint-set data structure, kruskal's algorithm, Minimum spanning tree, finding set representatives , merging two sets , Different types of advanced file formats like CSV, JSON, digital audio/ video file formats , text file formats, binary files, file handling techniques.	10
Text Books	1.Data Structure by Schaum Lipschutz 2. Data Structures and Algorithms in Python by Michael T.Goodrich: https://www.pdfdrive.com/data-structures-and-algorithms-in-pythone25119593.html	
Ref Books	1.Fundamental of Data structure by Ellis Horowitz and Sartaj Sahni :https://www.pdfdrive.com/fundamentals-of-data-structures-ellishorowitz-sartaj-sahni-e42166243.html. 2. Principles-of-data-structures-using-c-and- c++ by Das,Vinu V :https://www.pdfdrive.com/principles-of-data-structures-using-c-and-ce19847224.html	

Subject Code	20BVSD305
Subject Name	Statistical Analysis
Total Lectures	**60**
Total Credits	**4**

Units	Contents	Total Lectures
I	**Probability.** Definition and interpretation, Bayes' theorem, random variables, probability density functions, expectation values, transformation of variables, error propagation. **Probability functions.** Binomial, multinomial, Poisson, uniform, exponential, Gaussian, chi-square, Cauchy distributions	15
II	**The Monte Carlo method.** Random number generators, the transformation method, the acceptance-rejection method. **Statistical tests.** Significance and power of a test, choice of the critical region. Constructing test statistics: the Fisher discriminant, neural networks, etc. Testing goodness-of-fit, chi^2-test, P-values. **Parameter estimation: general concepts.** Samples, estimators, bias. Estimators for mean, variance, covariance.	15
III	**The method of maximum likelihood.** The likelihood function, ML estimators for parameters of Gaussian and exponential distributions. Variance of ML estimators, the information inequality, extended ML, ML with binned data. **The method of least squares.** Relation to maximum likelihood, linear least squares fit, LS with binned data, testing goodness-of-fit, combining measurements with least squares	15
IV	**Interval estimation.** Classical confidence intervals: with Gaussian distributed estimator, for mean of Poisson variable. Setting limits, limits near a physical boundary. **Nuisance parameters, systematic uncertainties.** Connection between systematic uncertainty and nuisance parameters. Profile likelihood, Bayesian treatment, marginalization with MCMC. **Examples of the Bayesian approach.** Bayesian treatment of nonGaussian systematic errors. Model selection using Bayes factors.	15
Text Books	Statistical Data Analysis, Glen Cowan, Oxford Science Publication. EBook: http://www.sherrytowers.com/cowan_statistical_data_analysis.pdf	

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Semester IV

Syllabus (Credit Based)

Year 2020-21

B. Voc. Software Development

Semester IV

Subject Code	**20BVSD401**	
Subject Name	**Environment Education**	
Short Name		
Total Lectures	**60**	
Total Credits	**4**	
Units	**Contents**	Total Lectures
I	The multidisciplinary nature of environmental studies: Definition, Scope and importance, Need for public awareness.Human population and the environment: Population Explosion, Human Rights, Environment and Human Health, Women and Child Welfare Programme	15
II	Social Issues and The Environment: From unsustainable development to sustainable development, Water conservation- Rain water harvesting, Watershed management, Global Warming, Acid-rain, Environment ProtectionAct, Air (Prevention and Control of pollution), Act, Wildlife protection Act.	15
III	Natural Resources: Renewable and non-renewable resources, Forest resources, Water resources, Mineral resources, Food resources, Land resources. Ecosystem, Biodiversity and its conservation: Ecosystem-Concept ofecosystem, Structure and functions of ecosystem, Structure and functions of ecosystem- Forest ecosystem, Grassland ecosystem, Desert ecosystem ,Aquatic ecosystem,	15
IV	Biodiversity: Introduction- Definition, Genetic, Species and Ecosystemdiversity, Values of biodiversity, Hot-spots of biodiversity, threats tobiodiversity, Conservation of biodiversity: In-situ and Exsitu conservation. Environmental Pollution: Causes, effects and control measures of- Airpollution, Soil pollution, Water pollution, Noise pollution, Thermal pollution,Solid waste management.	15
Text Books	• Prof. K. Gawai, Environmental studies, Sanskar publications. • Environmental studies: R. Rajgopalan, Oxford uni.press, New Delhi, 2005.	
Ref Books	• Agarwal, K. C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner. • BharuchaErach, The Biodiversity of India, Mapin Publishing Pvt. Ltd.,Ahmedabad – 380 013, India, Email:mapin@icenet.net (R)	

Subject Code	20BVSD402
Subject Name	Python Programing

Total Lectures	60	
Total Credits	**4**	
Units	**Contents**	**Total Lectures**
I	Introduction to Python and Computer Programming, Data Types, Variables, Basic Input-Output Operations, Basic Operators, Python literals, Operators - data manipulation tools, Variables - data-shaped boxes	15
II	Boolean Values, Conditional Execution, Loops, Lists and List Processing, Logical and Bitwise Operations Making decisions in Python, Python's loops Logic and bit operations in Python Lists - collections of data Sorting simple lists - the bubble sort algorithm	15
III	Functions, Tuples, Dictionaries, and Data Processing Writing functions in Python, How functions communicate with their environment? Returning a result from a function, Scopes in Python Modules, Packages, String and List Methods, and Exceptions: Using modules, Some useful modules What is package? Errors - the programmer's daily bread, the anatomy of exception, Some of the most useful exceptions, Characters and strings vs. computers, Python's nature of strings, String methods, Strings in action	15
IV	The Object-Oriented Approach: Classes, Methods, Objects, and the Standard Objective Features; Exception Handling, and Working with Files, Basic concepts of object programming, A short journey from procedural to object approach, Properties, Methods Inheritance - one of object programming foundations Generators and closures, Processing files, Working with real files	15
	Text Book: Programming Python, by Mark Lutz Python for Everybody: Exploring Data in Python, by Charles Severance	

Subject Code	**20BVSD403**
Subject Name	**Lab Based on Programing in Python**
Total Lectures	**120 Hours**
Total Credits	**4**

Subject Code	20BVSD404

Subject Name	Statistical Methods for Business Analysis	
Total Lectures	**60**	
Total Credits	**4**	
Units	**Contents**	**Total Lectures**
I	Descriptive Statistics, Introduction to the Box Plot and the Standard Deviation, The Standard Deviation "Rule of Thumb", Testing the "Rule of Thumb", Chebyshev's Theorem, Basic Data Descriptors and Data Distributions	15
II	Qualitative and Quantitative Data, Measure of Central Tendency (Mean, Median and Mode), Measure of Positions (Quartiles, Deciles, Percentiles and Quantiles), Measure of Dispersion (Range, Median, Absolute deviation about median, Variance and Standard deviation), Anscombe's quartet, Other Measures: Quartile and Percentile, Interquartile Range Covariance, Correlation, Causation, Probability and Random variable, Statistical Distribution, Descriptive Measures of Association, Probability, and Data Distributions	20
III	Probability Density Function and Area Under the Curve The Normal Distribution, The NORM.DIST Function, The NORM.INV Function, Applying the Normal Distribution, applying Standard Normal Distribution, Population and Sample data, Central Limit Theorem, The Binomial Distribution, Business Application of the Binomial Distribution, Poisson Distribution	15
IV	Data Analysis using Excel: Using the "VLOOKUP" Function Across Worksheets, Data Filtering in Excel, Use of Pivot Tables, More Pivot Table Options, Application of Pivot Tables to Numeric Data, Introduction to Charts in Excel, Pivot Charts, Scatter Plots, Histograms	10
	Text Books: 1. An Introduction to Statistical Methods, vby C B Gupta, Vijay Gupta, Vikas Publication 2. Statistical Methods for Business Data Analysis Using SPSS by Basel M. Al-Eideh, Scholor's Press	

Subject Code	20BVSD405	
Subject Name	Artificial Intelligence and Machine Learning	
Total Lectures	**60**	
Total Credits	**4**	
Units	**Contents**	**Total Lectures**
I	Foundations for AI: AI: Application areas, AI Basics (Divide and Conquer, Greedy, Branch and Bound, Gradient Descent), NN basics (Perceptron and MLP, FFN, Backpropagation)	13
II	Foundations for ML: ML Techniques overview , Validation Techniques (Cross-Validations) , Feature Reduction/Dimensionality reduction , Principal components analysis (Eigen values, Eigen vectors, Orthogonality)	15
III	**Clustering**: Distance measures, Different clustering methods (Distance, Density, Hierarchical), Iterative distance-based clustering; Dealing with continuous, categorical values in K-Means, Constructing a hierarchical cluster, K-Medoids, k-Mode and density-based clustering , Measures of quality of clustering	15
IV	Classification: **Naïve Bayes Classifier**, Model Assumptions, Probability estimation, Required data processing, M-estimates, Feature selection: Mutual information , Classifier**, K-Nearest Neighbors**: Computational geometry; Voronoi Diagrams; Delaunay Triangulations, K-Nearest Neighbor algorithm; Wilson editing and triangulations, Aspects to consider while designing K-Nearest Neighbor **Support Vector Machines:**Linear learning machines and Kernel space, Making Kernels and working in feature space, SVM for classification and regression problems. **Decision Trees**: ID4, C4.5, CART	17
	Text Books: 1. Artificial Intelligence For Dummies (For Dummies (Computer/Tech) Kindle Edition, by John Paul Mueller (Author), Luca Massaron, O'Really, 2nd Edition 2. Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, by Aurélien Géron,	

Subject Code	**20BVSD406**
Subject Name	**Lab Based on Machine Learning**
Total Lectures	**120 Hours**
Total Credits	**4**

Subject Code	**20BVSD407**
Subject Name	**Lab Based on Data Analysis and Visualization Tools**
Total Lectures	**120 Hours**
Total Credits	**4**

Subject Code	**20BVSD408**
Subject Name	**Mini Project**
Total Lectures	**60 Hours**
Total Credits	**2**

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Semester-V and VI

Syllabus (Credit Based)

Year 2020-21

B. Voc. (Software Development)

Semester-V

Subject Code	20BVSD501	
Subject Name	Data Management Standards and Regulations	
Total Lectures	**60**	
Total Credits	**4**	
Units	**Contents**	**Total Lectures**
I	Identify general principles and basic concepts of data management standards across the globe • Identify the key actors under the regulations and understand their roles • Evaluate the rights of data owners	15
II	Evaluate various enforcement and compliance mechanisms • Act in accordance with enforcement and compliance obligations, Evaluate different platforms on which the solution is to be deployed • Assess solution architecture constraints, i.e., deploying a solution on web vs mobile platforms	15
III	Solution on web vs mobile platforms • Assess the performance of the application on different platforms • Perform impact analyses to review the uses and limitations of deploying the solution across different platforms • Select an appropriate platform for the deployment of the solution • Determine the solution architecture based on the type of platforms such as a Thin Clients, Thick Clients or Smart Clients	15
IV	Define system level architecture for the solution • Develop solution architectures using appropriate design standards, methods and tools • Translate component specifications into detailed designs for implementation • Build architectures that are distributed and highly scalable • Monitor performance of the solution architecture • Assess the implications of the business, technical and data requirements on the design of solution architecture	15
	1. Data Stewardship: An Actionable Guide to Effective Data Management and Data Governance 1st Edition, by David Plotkin, Publisher-David Poltkin 2. Data Governance: How to Design, Deploy and Sustain an Effective Data Governance Program, Morgan Templer	

Subject Code	20BVSD502
Subject Name	Embeded Systems Design

Total Lectures	60	
Total Credits	**4**	
Units	**Contents**	**Total Lectures**
I	Characteristics of Embedding Computing Applications, Concept of Real time Systems, Challenges in Embedded System Design, Design Process, Requirements, Specifications, Architecture Design, Designing of Components, System Integration, Embedded System Architecture	15
II	Embedded System Architecture: Instruction Set Architecture, CISC and RISC instruction set architecture, Basic Embedded Processor/ Microcontroller Architecture, CISC Examples, Motorola (68HC11) Example, 8051 2.2.2 RISC Example, ARM, DSP Processors, Harvard Architecture, PIC	15
III	I/O Devices: Timers and Counters, Watchdog Timers, Interrupt Controllers, DMA Controllers, A/D and D/A Converters, Displays, Keyboards, Infrared devices, Component Interfacing, Memory Interfacing, I/O Device Interfacing, Interfacing Protocols, GPIB, FIREWIRE, IRDA	15
IV	Designing with Processors: System Architecture, Hardware Design, FPGA Based Design, Implementation, Development Environment, Debugging Techniques, Manufacturing and Testing	15
	Text Books: The Art of Designing Embedded Systems Kindle Edition, by Jack Ganssle Embedded Systems: Architecture, Programming and Design, Raj Kamal The 8051 Microcontroller and Embedded Systems: Using Assembly and C, By Mazidi and Macinlay, Pearson	
	References : Making Embedded Systems: Design Patterns for Great Software Kindle Edition, by Elecia White Programming Embedded Systems: With C and GNU Development Tools, Michael Barr	

Practical Subjects

Subject Code	**20BVSD503**
Subject Name	**Lab Based on Embedded Systems**
Total Lectures	**120 Hours**
Total Credits	**4**

Subject Code	20BVSD504	
Subject Name	IoT Platform and Architecture Design	
Total Lectures	**60**	
Total Credits	**4**	
Units	**Contents**	**Total Lectures**
I	Overview of IoT and High level Architecture: What Is the Internet of Things (IoT)? Brief History and evolution of IoT, IoT Architecture, Trends in the Adoption of IoT, IoT Is Powerful and Pervasive, Societal Benefits of IoT, Risks, Privacy, and Security,Setup IoT Platform: (Opensource IoT Platform on local machine), Setup IoT Platform: (Amazon IoT platform), IoT Use case-1: Implementation on two platform: Opensource IoT platform and Amazon IoT cloud), IoT Usecase-2: Implementation: Opensource IoT platform, Amazon IoT cloud	15
II	IoT Cloud Infrastructure, Programming with Advanced C / Embedded C Micro-controller programming using Arduino:Understand Embedded Systems and its components, Learn how to build embedded applications using Arduino Platform, Become familiar with hardware interfacing using Arduino, Should be able to read device datasheets and board schematics, Learn basic communication protocols and communicate using Arduino Libraries, Build IoT applications using wired and wireless protocols (ex: Bluetooth, Wifi), Debug applications using Arduino IDE	15
III	IoT Communication Models and Protocols, Request-Response, PublishSubscribe, Push-Pull, Exclusive Pair Application Protocols: HTTP, CoAP, MQTT, AMQP, Communication APIs: REST-based, Web Socket-based, Network Layer: IPv4, IPv6, 6LoWPAN	15
IV	Building IoT Solutions with Python Building IoT Applications using Raspberry Pi: Overview of Raspberry Pi (RPi) hardware platform, Peripherals on Rpi, Setup and Install Raspbian OS on Rpi, Overview of Linux OS and its sub-systems, Process and Memory Mangement, Multi-Threading, IPC, □ Install packages on Raspbian OS □ Setting up Raspbian as an IoT gateway □ Write Python program to interface with Arduino using serial libraries	15
Text Books	The Art of Designing Embedded Systems Kindle Edition, by Jack Ganssle Embedded Systems: Architecture, Programming and Design, Raj Kamal The 8051 Microcontroller and Embedded Systems: Using Assembly and C, By Mazidi and Macinlay, Pearson	

Ref Books	Making Embedded Systems: Design Patterns for Great Software Kindle Edition, by Elecia White Programming Embedded Systems: With C and GNU Development Tools, Michael Barr	

Subject Code	20BVSD505
Subject Name	IoT Platform: Performance and Security
Total Lectures	**60**
Total Credits	**4**

Units	**Contents**	**Total Lectures**
I	IoT cloud building blocks, Using the platform specific dashboards, Device configuration and addressing, IoT Platforms in detail, MQTT Server	15
II	Injection Engine, Time Series database, Rules Engine, Data monitoring, visualization and IoT Analytics	15
III	Rest API interface, Device Management, Application Service, Benchmarking IoT applications and Platforms	15
IV	Performance measure of IoT platforms, MQTT vs HTTP performance, Security considerations, Firmware updates, Cryptography basics, Cryptography in IoT, Privacy considerations and design guidelines	15
	Text Books: IoT Security Issues, ***by Alasdair Gilchrist*** Demystifying Internet of Things Security: Successful IoT Device/Edge and Platform Security Deployment by Sunil Cheruvu, Anil Kuar, Ned Smith and David Wheeler	

Practical Subjects

Subject Code	**20BVSD506**
Subject Name	**Lab Based on IoT Solution Design (Raspberry Pi, Aurdino)**
Total Lectures	**120 Hours**
Total Credits	**4**

Subject Code	**20BVSD507**
Subject Name	**Mini Project**
Total Lectures	**150 Hours**
Total Credits	**4**